Our Reference: VMA-380-B

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Harry C. Buchanan Jr., Yaomin Dong, & Frederick M. Goerz
Serial Number:	09/727,725
Filing Date:	December 1, 2000
Examiner/Art Group Unit:	Hansen, C./3682
Title:	BALL NUT AND METHOD OF HIGH VOLUME MANUFACTURING OF THE SAME

CERTIFICATE OF MAILING AND TRANSMITTAL LETTER

BOX: AF
Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

Transmitted with this document is a Postcard; Appeal Brief in triplicate with attached Appendix A in the above-identified application.

X A check in the amount of $320.00 is attached.

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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner of Patents, Washington, D.C. 20231, on **April 10, 2003**.

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APPEAL BRIEF

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

Please enter the following Appeal Brief in the appeal filed February 10, 2003.

REAL PARTY IN INTEREST

The real party in interest is Valeo Electrical Systems, Inc. by recorded Assignment of rights on Reel #011326/ Frame #0023.

RELATED APPEALS AND INTERFERENCES

There are no related Appeals and Interferences.

STATUS OF CLAIMS

Claims 1-38 and 40-47 are pending in the application. Claims 11-26 have been withdrawn from consideration. The examination has been restricted to the embodiment of the present invention illustrated in Figures 18 and 19. Claims 1-9, 27-38, and 40-47 stand rejected under 35 U.S.C. §102(b) over Nilsson (U.S. Patent No. 4,364,282) and also under 35 U.S.C. §102(b) under Galonska (U.S. Patent No. 3,006,212). Claims 10 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Nilsson ('282), and also under 35 U.S.C. §103(a) as being unpatentable over Galonska ('212). These rejections are set forth in the Final Office

Action dated October 4, 2002. A copy of the claims as currently on appeal are attached in Appendix A.

STATUS OF AMENDMENTS

No After Final Amendments were filed in response to the Office Action dated October 4, 2002.

SUMMARY OF THE INVENTION

The present invention as best seen in Figures 18, and 19 includes a ball nut 10, and a method for producing a ball nut, having at least one internal bearing race with a first end and a second end. Page 12, line 2 through 4. At least one recirculating crossover passage 18 connects the first end with the second end of the helical groove portion 16 to form a continuous recirculating path 12 for a plurality of ball bearings 14. Page 12, lines 4 through 7. The ball nut 10 is formed as an eyelet 40 with a helix passage 42 for receiving a plurality of ball bearings 44 in a flange end 46. Page 12, lines 7 through 9. A crossover passage 48 is defined in the flange end 46, such that the crossover passage 48 is in communication with the helix passage 42 for returning the plurality of ball bearings 44 from one end of the helix passage 42 to an opposite end of the helix passage 42. Page 12, lines 9 through 13. Two eyelets 40 are assembled in flange-to-flange relationship with respect to one another to define at least one raceway having a single recirculating rotational path 50 for receiving the plurality of ball bearings 44. Page 12, lines 13 through 16. The assembled eyelets can be overmolded to provide a unitary ball nut. Page 12, lines 16 through 17. Preferably, the eyelets 40 are identical to one another. Page 12, lines 19 through 20. The eyelet 40 can be a drawn eyelet 40 with a coined helix passage 42 and crossover passage 48 in the flange 46 of the eyelet 40. Page 12, lines 20 through 22. The two

eyelets can be held with respect to one another with a lock member 52. Page 12, lines 22 through 24. At least one tab 54 can be formed on the flange end 46 of the eyelet 40 to define the lock member 52. Page 12, lines 24 through 26. A plurality of ball bearings 44 can be assembled within the helix passage 42 and the crossover passage 48. Page 12, lines 26 through 28. A punch or diverter can extend within the helix passage 42 to direct ball bearings 44 into the crossover passage 48. Page 12, lines 28 through 30. The eyelet can be formed of a metal material selected from a group including steel, hardened steel, melonited steel, heat treated steel, stainless steel, spherodized stainless steel, annealed stainless steel, and heat treated stainless steel. Page 12, lines 30 through page 13, line 3. Preferably the eyelet is hardened to approximately 62 R_C after being formed. Page 13, lines 2 through 3. A drawn eyelet 40 is formed with a helix passage 42 in the flange end 46 and a crossover passage 48 is defined to provide a ball return to the helix passage 42. Page 13, lines 5 through 7. The drawn and coined eyelet 40 is designed to fit exactly with a duplicate drawn and coined eyelet 40 to trap the balls 44 between the two when positioned in flange-to-flange relationship with respect to one another. Page 13, lines 7 through 10. A holding lock 52 can be provided to hold the eyelets 40 together. Page 13, lines 10 through 12.. The assembled eyelets 40 can be overmolded, to provide a solidly configured ball nut. Page 13, lines 12 through 13. Preferably, the eyelet 40 can be manufactured from steel, such as UNS-610090, hardened to approximately 55R_C to approximately 65R_C and preferably to approximately 62R_C and iron nitride hardened, or stainless steel, such as UNS-54000, spherodized, annealed and heat treated. Page 13, lines 13 through 16. The lock 52 can include one or more tabs 54 placed on the

flange end 40 to hold the assembly together. Page 13, lines 17 through 18. A punch or diverter can be provided to direct the balls 44 into the crossover passage 48. Page 13, lines 19 through 20.

ISSUES ON APPEAL

1. Are claims 1-9, 27-38, and 40-47 properly rejected under 35 U.S.C. §102(b) as being anticipated by Nilsson (U.S. Patent No. 4,364,282)?

Examiner answers: Yes

Appellant answers: No

2. Are claims 1-9, 27-38, and 40-47 properly rejected under 35 U.S.C. §102(b) as being anticipated by Galonska (U.S. Patent No. 3,006,212)?

Examiner answers: Yes

Appellant answers: No

3. Are claims 10 and 36 properly rejected under 35 U.S.C. §103(a) as being unpatentable over Nilsson ('282)?

Examiner answers: Yes

Appellant answers: No

4. Are claims 10 and 36 properly rejected under 35 U.S.C. §103(a) as being unpatentable over Galonska ('212)?

Examiner answers: Yes

Appellant answers: No

GROUPING OF CLAIMS

Claims 1-9, 27-35, and 37 rise and fall together. Claims 38-43 rise and fall together. Claims 44-47 rise and fall together. Claims 10 and 36 rise and fall independently.

ARGUMENT

1. Section 102(b) rejection based on Nilsson ('282)

The Examiner states that Nilsson '282 discloses a ball nut in Figure 1 having at least one internal bearing race with a first end and a second end, and a crossover passage shown in Figure 2 for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings. The Examiner further asserts that Nilsson '282 discloses at least two eyelets, identified by ends of 13, 14, 15, 18, where each eyelet has a helix passage for receiving a plurality of ball bearings formed in the flange end and a crossover passage formed in the flange end, and the crossover passage in communication with the helix passage for returning the plurality of ball bearings, wherein assembling the two eyelets and flange-to-flange relationship with respect to one another defines at least one raceway having a single recirculation rotational path for receiving the plurality of ball bearings. The Examiner asserts that the eyelets 13, 14, 15, 18 are identical to one another.

In this rejection, the Examiner's interpretation of the term eyelet is inconsistent with the common definition of the term eyelet given in the dictionary and as used in the disclosure of the present application and in the claims. In particular, Webster's New World Dictionary, Third College Edition copyright 1988 defines the term "eyelet" as (1) a small hole for receiving a shoestring, rope, cord, hook, etc.; (2)

a metal ring or short tube for reinforcing such a hole; (3) a small hole edged by stitching in embroidered work; (4) a peephole or loophole; (5) a small eye; ocellus. In each case, the eyelet is defined as having an aperture, and more particularly an aperture for receiving an elongate member, such as a shoestring, rope, cord, or hook (or in the instant case a screw). The Examiner's reliance on the Nilsson reference does not meet the limitations of the claims in the present application since each metal sheet halve 4, 5 does not include a through aperture for receiving the screw 1 as required by the proper interpretation of the claims of the present application. At best, the Nilsson reference shows two sheet metal halves 4, 5 where each sheet metal half includes only a portion of the through aperture for receiving the screw 1. Therefore, the individual parts are not each individually eyelets but must be assembled to one another in order to form a ring of metal defining an aperture or hole extending therethrough (i.e. an assembled eyelet). Therefore, the Nilsson reference does not anticipate, teach or suggest the invention as recited in the present claims. In other words, each eyelet, as that term is commonly understood and used in the present claims of the application, has an aperture extending therethrough surrounded by a helix passage for receiving a plurality of ball bearings formed in the flange end and a crossover passage formed in the flange end. Each of the two metal halves 4, 5 disclosed in Nilsson do not individually form a metal ring or eyelet until assembled to one another, and therefore do not meet the limitations of the claims of the present application. Furthermore, the definition of an eyelet implicitly requires that the flanges extend transversely to the longitudinal axis of the screw 20 in the present application and claims, which is inconsistent with the longitudinally extending flanges

of the Nilsson '282 reference. Accordingly, it is submitted that the Examiner's rejection of claims 1-9, and 27-37 is improper and should be reversed.

With respect to claims 38-43, the Nilsson reference does not anticipate, teach or suggest the ball nut body having an elongate generally cylindrical shaped metal injection molded body as recited in claims 38-43. Therefore, the Nilsson '282 reference does not meet the requirements of a proper Section 102(b) rejection. Accordingly, it is submitted that the Examiner's rejection of claims 38-43 is improper and should be reversed.

With respect to claims 44-47, the Nilsson reference fails to anticipate, teach or suggest a first portion of a groove and a first portion of a crossover passage formed in a first face of a first flange region operably positionable in communication with a second portion of the groove and a second portion of the crossover passage in a second face of a second flange region as recited in those claims. The Nilsson reference does not teach or suggest this structural configuration, since Nilsson teaches forming the complete cross- over passage 18 in one part, while a second complete cross over passage 19 is formed in the other part. In particular, the Nilsson reference discloses a portion of the groove formed in the cylindrical surface of the two metal sheet halves 4, 5 and fails to form any portion of the groove or the recirculating passage in the flange portions 8, 9, 10, 11. This can best be understood by recognizing that the flange portions extend longitudinally with respect to the rotational axis of the screw in Nilsson, while the flange 46 extends outwardly in a transverse direction with respect to the longitudinal axis of the screw 20 as best seen

in Figure 18 of the present application. Accordingly, it is submitted that the Examiner's rejection of claims 44-47 is improper and should be reversed.

2. Section 102(b) rejection based on Galonska '212

The Galonska '212 reference fails to anticipate, teach or suggest at least two eyelets, as the term is defined in the dictionary, and as used in the disclosure and claims of the present application corresponding to Figures 18 and 19. In particular, it is clearly seen that the flanges 22 of Galonska '212 extend longitudinally along the rotational axis of the screw 10, while the flanges 46 in the present invention extend transversely with respect to the longitudinal axis of the screw 20. In particular, Webster's New World Dictionary, Third College Edition copyright 1988 defines the term "eyelet" as (1) a small hole for receiving a shoestring, rope, cord, hook, etc.; (2) a metal ring or short tube for reinforcing such a hole; (3) a small hole edged by stitching in embroidered work; (4) a peephole or loophole; (5) a small eye; ocellus. In each case, the eyelet is defined as having an aperture, and more particularly an aperture for receiving an elongate member, such as a shoestring, rope, cord, or hook. Accordingly, the Galonska '212 reference does not teach or suggest an eyelet having an aperture extending therethrough surrounded by a helix passage for receiving a plurality of ball bearings formed in a flange end and a crossover passage formed in the flange end as recited in the present claims on appeal. The two halves of the Galonska '212 ball nut must be assembled with respect to one another before a metal ring or eyelet is formed allowing passage of the screw. This configuration does not meet the limitations set forth in the claims of the present application. Furthermore, the definition of an eyelet implicitly requires that the flanges extend transversely to the

longitudinal axis of the screw 20 in the present application and claims, which is inconsistent with the longitudinally extending flanges of the Galonska '212 reference. Accordingly, it is submitted that the Examiner's rejection of claims 1-9, and 27-37 is improper and should be reversed.

With respect to claims 38-43, the Galonska '212 reference does not anticipate, teach or suggest the ball nut body having an elongate, generally cylindrical shaped, metal injection molded body as recited in these claims. Accordingly, it is submitted that the Examiner's rejection of claims 38-43 is improper and should be reversed.

With respect to claims 44-47, the Galonska '212 reference does not teach or suggest a first portion of a groove in a first portion of a crossover passage in a first face of a first flange region operably positionable in communication with a second portion of the groove and a second portion of the crossover passage in a second face of a second flange region as recited in these claims. The only portion formed in the flat flange region of the Galonska reference is the crossover passage 36, which does not meet the structural limitations as set forth in claims 44-47. As clearly defined in the language of the claim, each groove has a first portion and a second portion which are formed in first and second faces of flange regions which form the groove when assembled in face to face relationship with respect to one another. The Galonska '212 reference teaches forming grooves in the cylindrical surface portion of the two metal halves 16 and not in the flange portions 20, 22. This again is a result of the flanges of Galonska '212 extending longitudinally with respect to the rotational axis of the screw 10 rather than transversely as required by the use of the specific

structural term "eyelet" in the claims of the present application. Accordingly, the Galonska '212 reference fails to anticipate, teach or suggest this specific structural configuration as recited in these claims. Accordingly, it is submitted that the Examiner's rejection of claims 44-47 is improper and should be reversed.

3. Section 103(a) rejection based on Nilsson ('282)

The Nilsson '282 reference fails to anticipate, teach or suggest the specific structural limitations as recited in claim 10 and/or claim 36. In particular, the Nilsson '282 reference does not teach or suggest any particular hardness for the part disclosed and therefore is completely lacking as forming a proper basis for a prima facie obviousness rejection. The Examiner has failed to cite any reference which teaches or suggests the hardness claimed in the present application. If it has been held to be within the general skill of a worker in the art to select a known material on the basis for its suitability for the intended purpose as a matter of obvious design choice, then the Examiner should have been able to find a reference that at least discussed the relevant hardness ranges claimed in the present application. However the Examiner has failed to cite any reference dealing with hardness of ball nuts, and such a lack of references has been found to be an indicator of patentability as opposed to obviousness. Furthermore, it is improper to rely on an unsupported assertion of obviousness when requested to find a reference that supports the asserted position. Accordingly, it is submitted that the Examiner's rejection of claim 10 and/or claim 36 is improper and should be reversed.

4. Section 103(a) rejection based on Galonska ('212)

The Galonska '212 reference fails to anticipate, teach or suggest the specific structural limitations as recited in claim 10 and/or claim 36. In particular, the Galonska '212 reference does not teach or suggest any particular hardness for the part disclosed and therefore is completely lacking as forming a proper basis for a prima facie obviousness rejection. The Examiner has failed to cite any reference which teaches or suggests the hardness claimed in the present application. If it has been held to be within the general skill of a worker in the art to select a known material on the basis for its suitability for the intended purpose as a matter of obvious design choice, then the Examiner should have been able to find a reference that at least discussed the relevant hardness ranges claimed in the present application. However the Examiner has failed to cite any reference dealing with hardness of ball nuts, and such a lack of references has been found to be an indicator of patentability as opposed to obviousness. Furthermore, it is improper to rely on an unsupported assertion of obviousness when requested to find a reference that supports the asserted position. Accordingly, it is submitted that the Examiner's rejection of claim 10 and/or claim 36 is improper and should be reversed.

At best, the prior art references show components in bits and pieces of the inventive arrangement as claimed in the independent claims. The relevant art recognizes many components and concepts within its domain. Upon close investigation and scrutiny of the diverse practices in this art and its peripheral technical fields of endeavor, a fact-finder is inevitably led to the conclusion that artisans can and could produce a myriad of devices and functions of apparently

endless diversity from components and concepts already individually recognized as belonging to the prior art. Such speculation must not cloud the standards for the evaluation of patentability over the prior art under 35 U.S.C. §§ 102 and 103. Properly focused, the issues center on what would have been anticipated, or obvious to one of ordinary skill in the art at the time of the invention. Obviousness is tested by what the combined teaching of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. See *ACS Hosp. Sys. Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). And teachings of references can be combined only if there is some suggestion or incentive to do so. See *In re Fine*, 837 F.2d 1071, 5 USPQ 2d 1596, 1599 (Fed. Cir. 1988). Approaches to obviousness determinations which focus merely on identifying and tabulating missing elements in hindsight retrospect imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, and, fall victim to the insidious effect of hindsight syndrome wherein that which only the inventor taught is used against its teacher. *W. L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 312-3 (Fed. Cir. 1983). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 5 USPQ 2d at 1600.

For the reasons stated above, it is respectfully submitted that Appellants' invention as set forth in claims 1-10, 27-38, and 40-47 patentably define over the cited references and is not suggested or rendered obvious thereby. As such, it is respectfully submitted that the Examiner's final rejection of claims 1-10, 27-38, and 40-47 is erroneously based and its reversal is respectfully requested.

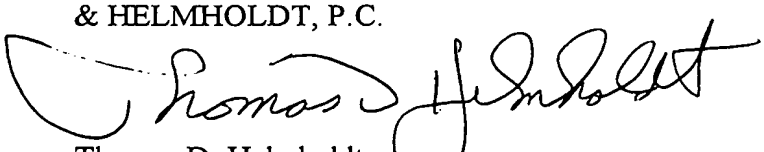
No oral hearing is requested.

Appellants' attorney's check in the amount of $320.00 is enclosed to cover the Appeal Brief filing fee.

This Appeal Brief is being filed in triplicate including one original and two copies.

Respectfully submitted,

YOUNG, BASILE, HANLON, MacFARLANE, WOOD & HELMHOLDT, P.C.



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Dated: April 10, 2003
TDH/cmp

APPENDIX A

1. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

at least two eyelets, each eyelet having a helix passage for receiving a plurality of ball bearings formed in a flange end and a crossover passage formed in the flange end, the crossover passage in communication with the helix passage for returning the plurality of ball bearings, wherein assembling the two eyelets in flange-to-flange relationship with respect to one another defines at least one raceway having a single recirculating rotational path for receiving the plurality of ball bearings.

2. The ball nut of claim 1 further comprising:

the assembled eyelets overmolded to provide a unitary ball nut.

3. The ball nut of claim 1 wherein the eyelets are identical to one another.

4. The ball nut of claim 1 further comprising:

the eyelet drawn and coined to form the helix passage and crossover passage in the flange end of the eyelet.

5. The ball nut of claim 1 further comprising:

a lock member for temporarily holding the two eyelets with respect to one another.

6. The ball nut of claim 5 further comprising:

at least one tab formed on the flange end of the eyelet to define the lock member.

7. The ball nut of claim 1 further comprising:

the plurality of ball bearings inserted within the helix passage and the crossover passage during assembly.

8. The ball nut of claim 1 further comprising:

a diverter extending with respect to the helix passage to direct ball bearings into the crossover passage.

9. The ball nut of claim 1 wherein the eyelet is formed of a metal material selected from a group including steel, hardened steel, melonited steel, heat treated steel, stainless steel, spherodized stainless steel, annealed stainless steel, and heat treated stainless steel.

10. The ball nut of claim 1 further comprising:

the eyelet hardened to approximately R_c 62.

11. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

an elongate, generally cylindrical-shaped, metal injection molded ball nut body with a helix passage for receiving a plurality of ball bearings.

12. The ball nut of claim 11 further comprising:

the ball nut body having a slot defined through a portion of the circumference extending along an entire longitudinal length of the ball nut body, such that the ball nut body has a generally C-shaped cross-section along the entire longitudinal length; and

a side insert formed engageable with the slot in the ball nut body, the side insert having ball-stops and a crossover passage defined therein, and the side insert assembled with respect to the ball nut body to define at least one raceway having a single recirculating rotational path for receiving the plurality of ball bearings.

13. The ball nut of claim 12 wherein the side insert is formed of plastic.

14. The ball nut of claim 11 further comprising:

a plurality of individual raceways having separate recirculating rotational paths disposed parallel with respect to one another for receiving the plurality of ball bearings.

15. The ball nut of claim 11 wherein the ball nut body is injection molded of stainless steel.

16. The ball nut of claim 11 further comprising:

the ball nut body carburized to a hardness of approximately 58 R_c.

17. The ball nut of claim 11 further comprising:

a ball-engaging surface finish of approximately 30-40 μ inches.

18. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

a flat metal strip having at least one groove formed therein for receiving a plurality of ball bearings, the strip rolled to a predetermined diameter and lead with the at least one groove facing radially inward; and

a carrier for receiving the rolled strip inserted therein, the carrier having a crossover passage formed therein to define at least one raceway having at least one recirculating rotational path for receiving the plurality of ball bearings.

19. The ball nut of claim 18 further comprising:
the flat metal strip having a coined groove.

20. The ball nut of claim 18 further comprising:
the flat metal strip having a through rolled groove.

21. The ball nut of claim 18 wherein the flat metal strip is formed of 410 martinsitic stainless steel.

22. The ball nut of claim 18 further comprising:
the carrier overmolded after insertion of the rolled strip.

23. The ball nut of claim 18 further comprising:
the strip having a roll formed groove therein defining a race for receiving the plurality of ball bearings, the strip formed of a constant thickness metal material.

24. The ball nut of claim 23 further comprising:
the strip hardened after roll forming the groove and rolled to the predetermined diameter and lead.

25. The ball nut of claim 18 further comprising:
the flat metal strip having a stamped groove and a stamped crossover passage therein for receiving a plurality of ball bearings, the crossover passage in communication with the groove for returning the plurality of ball bearings from one end of the groove to an opposite end.

26. The ball nut of claim 25 further comprising:

the stamped metal strip hardened after rolling to the predetermined diameter and lead.

27. A ball nut having at least one internal bearing race with a first end and a second end, and at least one recirculating crossover passage for connecting the first end with the second end to form a continuous recirculating path for a plurality of ball bearings, comprising:

means for forming an eyelet with a helix passage for receiving a plurality of ball bearings in a flange end;

means for defining a portion of a crossover passage in the flange end, the crossover passage in communication with the helix passage for returning the plurality of ball bearings; and

means for assembling two eyelets in flange-to-flange relationship with respect to one another to define at least one raceway having a single recirculating rotational path passing through aligned portions of the crossover passage formed by the flange-to-flange relationship of the two eyelets for receiving the plurality of ball bearings.

28. The ball nut of claim 27 further comprising:

means for over molding the assembled eyelets to provide a unitary ball nut.

29. The ball nut of claim 27 wherein the eyelets are identical to one another.

30. The ball nut of claim 27 wherein the means for forming further comprises:

means for drawing an eyelet; and

means for coining the helix passage and crossover passage in the flange end of the eyelet.

31. The ball nut of claim 27 wherein the means for assembling further comprises:

means for temporarily holding the two eyelets with respect to one another with a lock member.

32. The ball nut of claim 31 wherein the means for forming further comprises:

means for forming at least one tab on the flange end of the eyelet to define the lock member.

33. The ball nut of claim 27 wherein the means for assembling further comprises:

means for inserting the plurality of ball bearings within the helix passage and the crossover passage.

34. The ball nut of claim 27 further comprising:

means for providing a punch in the helix passage to direct ball bearings into the crossover passage.

35. The ball nut of claim 27 wherein the eyelet is formed of a metal material selected from a group including steel, hardened steel, melonited steel, heat treated steel, stainless steel, spherodized stainless steel, annealed stainless steel, and heat treated stainless steel.

36. The ball nut of claim 27 further comprising:

means for hardening the eyelet to approximately R_c 62.

37. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

at least two eyelets, each eyelet having a portion of a helix passage for receiving a plurality of ball bearings formed in a face of a flange end and a portion of a crossover passage formed in the face of the flange end, the crossover passage in communication with the helix passage for returning the plurality of ball bearings, the two eyelets operably engageable in face-to-face, flange-to-flange relationship with respect to one another to define one raceway having a single recirculating rotational path passing through aligned portions of the crossover passage formed by the face-to-face, flange-to-flange relationship of the two eyelets for receiving the plurality of ball bearings.

38. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

a ball nut body with at least one helix passage for receiving a plurality of ball bearings, a crossover passage formed to define an individual raceway for each helix passage, each raceway having a separate, single orbit, recirculating rotational path, the ball nut body having an elongate, generally cylindrical-shaped, metal injection molded body.

39. Cancelled without prejudice.

40. The ball nut of claim 38 further comprising:

means for forming a helical portion of each recirculating path to extend less than an entire circumference of an interior of the ball nut body from a first end to a second end; and

means for forming a crossover passage portion of each recirculating path to extend in communication between the first and the second end of the corresponding helical portion.

41. The ball nut of claim 40 further comprising:

means for angularly offsetting each crossover passage portion with respect to a longitudinally adjacent crossover passage portion.

42. The ball nut of claim 38 further comprising:

a helical portion of each recirculating path formed to extend less than an entire circumference of an interior of the ball nut body from a first end to a second end; and

a crossover passage portion of each recirculating path to extend formed in communication between the first and the second end of the corresponding helical portion.

43. The ball nut of claim 42 further comprising:

each crossover passage portion angularly offset with respect to a longitudinally adjacent crossover passage portion.

44. A ball nut having at least one internal bearing race with a first end and a second end, and at least one recirculating crossover passage for connecting the first end with the second end to form a continuous recirculating path for a plurality of ball bearings, comprising:

a first stamped part with a first portion of a groove and a first portion of a crossover passage in a first face of a first flange region from a flat metal strip for receiving a plurality of ball bearings;

a second stamped part with a second portion of the groove and a second portion of the crossover passage in a second face of a second flange region in the flat metal strip, the second portions of the groove and crossover passage of the second part

operably positionable in communication with the first portions of the groove and crossover passage of the first part for returning the plurality of ball bearings from one end of the groove to an opposite end; and

the first and second stamped parts assembled in face-to-face, flange-to-flange relationship with respect to one another to define a ball nut with a continuous recirculating path for a plurality of ball bearings.

45. The ball nut of claim 44 wherein the first and second stamped parts are identical to one another.

46. The ball nut of claim 44 further comprising:

the first and second stamped parts are hardened parts.

47. In a ball nut having at least one internal bearing race with a first end and a second end, and a crossover passage for connecting the first end and the second end to form a continuous recirculating path for a plurality of ball bearings, the improvement comprising:

a first stamped part having a first portion of a groove and a first portion of a crossover passage formed in a first face of a first flange for receiving a plurality of ball bearings;

a second stamped part having a second portion of the groove and a second portion of the crossover passage formed in a second face of a second flange, the second part operably positionable in face-to-face, flange-to-flange communication with the first part for returning the plurality of ball bearings from one end of the groove to an opposite end; and

means for connecting the first and second parts in face-to-face, flange-to-flange relationship with respect to one another to define a ball nut with a continuous recirculating path for a plurality of ball bearings.